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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,446	03/19/2004	Oleg Kolosov	1012-189 (2003-012R1)	7278
25215	7590	03/24/2006	EXAMINER	
DOBRUSIN & THENNISCH PC 29 W LAWRENCE ST SUITE 210 PONTIAC, MI 48326			MILLER, ROSE MARY	
			ART UNIT	PAPER NUMBER
			2856	

DATE MAILED: 03/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/804,446

Applicant(s)

KOLOSOV ET AL.

Examiner

Rose M. Miller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 27 and 28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-26 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11/4/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. In order to facilitate discussion on the information disclosure statement filed 04 November 2004, those references which have been crossed off for various reasons have been designated with alphabetical and alphabetical-numerical notes in the margin of the information disclosure statement.
2. The information disclosure statement filed 04 November 2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. The office did not receive a copy, or did not receive a complete copy, of those references designated as references B, C, D, E, F, H, I, J, P, and A27. Therefore, these references have been crossed off and not considered by the office.
3. The information disclosure statement filed 04 November 2004 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. The references designated as references A, G, and A23 were not accompanied by a statement of relevancy and therefore have not been considered.
4. The information disclosure statement filed 04 November 2004 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because the references have not been properly cited in accordance with 37 CFR 1.98(b) which requires each U.S. application listed in an information disclosure statement must be identified by the inventor, application number, and filing date and each publication listed in an information disclosure statement must be identified by publisher, author (if any), title, relevant pages of the publication, date, and place of publication. The following references were not considered as they did not have the proper information in the citation on the information disclosure statement: K, L, M, N, O, Q, R, S, V, W, X, Y, Z, A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, A21, A22, A24, A25, A26, A28, A29, A30, A31, A32, A33, and A34. Applicant is advised that the date of any re-submission of any item of information contained in this

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information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

5. Those US Applications designated as references T and U have been crossed off as the applications have matured into US Patents 6,507,945 and 6,658,429 respectively. The patents have been listed on the enclosed PTO-892.

6. Those US references that were crossed off the Information Disclosure Statement filed 04 November 2004 were crossed off, as they were duplicate citations.

7. Applicant is also reminded that when the disclosures of two or more patents or publications listed in an information disclosure statement are substantively cumulative, a copy of one of the patents or publications may be submitted without copies of the other patents or publications, provided that it is stated that these other patents or publications are cumulative.

8. In view of the overly large amount of information presented in the Information Disclosure statement, it is in the best interest of the Applicant to point out those references that are of particular interest in the present Application.

Drawings

9. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the electrical connection including at least one electrode that is at least partially covered by a dielectric material (as found in claims 1, 11, and 25), the electrical connection including a base material and a performance tuning material that is different (as found in claim 1), the performance tuning material including a layer entirely overlying a base resonator material (as found in claim 7), the performance tuning material being dispersed within the base material (as found in claim 7), or combinations of the performance tuning material being a layer partially overlying a base resonator material, being a layer entirely overlying a base resonator material, being an intermediate layer in the resonator, and being dispersed within the base material (as found in claim 7), the performance tuning

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material being employed as a layer that is continuous or intermittent, along edges of the resonator base material, within the interior of the resonator base material, or a combination thereof (as found in claim 23), must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 7, 8, and 10-26 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 7, 8, and 10-26, the phrase "diamond-like" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "-like"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1-3, 5-11, 16, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by **Ikegami et al. (US 5,918,354)**.

Ikegami et al. discloses a sensor employing a mechanical resonator (see Figures) comprising: a resonator portion (tuning fork 2) for resonating in a fluid (air); an electrical connection (5, 6) between the resonator portion and a source of an input signal (inherent in use of tuning fork), including at least one electrode (5, 6) that is at least partially covered by a dielectric material (resin layer 9, see Figure 3), wherein the resonator portion, the electrical connection or both includes a base material (quartz) and a performance tuning material (resin 9) that is different from the base material, is relatively hydrophobic (inherent in the silicon resin disclosed) and exhibits a porosity of less than about 5% of its volume (inherent in the silicon resin disclosed).

As for claims 2-3, **Ikegami et al.** clearly discloses utilizing a tuning fork as the mechanical resonator.

As for claims 5 and 6, **Ikegami et al.** clearly discloses utilizing a piezoelectric material (quartz) as the base material and the electrical connections including an electrode formed of chromium overlaid with gold (see column 8 lines 41-56).

As for claims 7 and 8, **Ikegami et al.** clearly discloses the performance-tuning material including a polymer resin or hydrocarbon (see column 10 lines 35-45).

As for claim 9, **Ikegami et al.** clearly discloses the performance-tuning material (layer 9) entirely overlying the base resonator material (see Figures and column 9 line 1 – column 10 line 65).

With regards to claims 10 and 12, **Ikegami et al.** clearly discloses a sensor employing a mechanical resonator (tuning fork 2) comprising: a resonator portion (tuning fork 2) including at least two tines adapted for resonating in a fluid and an electrical connection (5, 6, 16) including at least one electrode formed of a chromium metal overlaid with gold; wherein the resonator portion includes: a doped or undoped base material (quartz) that exhibits a dielectric constant that is substantially constant over a temperature range of at least about 0°C to about 100°C (inherent in the use of quartz) and a performance-tuning material that is relatively hydrophobic (inherent in silicon resin 9 disclosed), exhibits a porosity of less than 5% of its volume (inherent

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in the silicon resin disclosed) and is stable at about 150°C (inherent in silicon resin disclosed) and is different from the base material while being selected from the group of polymers (resin 9 is a polymer), ceramics, metals, metal carbides or nitrides, diamond, diamond-like carbon, and combinations thereof.

With regards to claim 11, **Ikegami et al.** discloses the at least one electrode is at least partially covered by a dielectric material (resin 9).

With regards to claim 16, **Ikegami et al.** clearly discloses the performance-tuning material comprising silicones.

With regards to claim 22, **Ikegami et al.** clearly discloses forming the resonator portion from a semiconductor wafer (see column 8 lines 54-68).

With regards to claim 23, **Ikegami et al.** clearly discloses the performance-tuning material (layer 9) entirely overlying the base resonator material (see Figures and column 9 line 1 – column 10 line 65).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

16. Claims 13-15, 17-21, and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ikegami et al.**

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With regards to claims 13-15, **Ikegami et al.** fails to disclose the base resonator material comprising lithium niobate, PZT, or gallo-germanate. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the resonator of **Ikegami et al.** with any one of these materials as the base material as all are well known throughout the art of mechanical resonators for their excellent piezoelectric properties. Therefore, one of ordinary skill in the art would know to select the base material most appropriate for the environment in which the resonator is to be operated in. Furthermore, it has been held by the courts that the use of routine experimentation to determine preferred materials and optimum ranges is not a patentable invention (see In re Aller, 105 USPQ 233 (CCPA 1955), In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980), and In re Leshin, 125 USPQ 416 (CCPA 1960)).

With regards to claims 17-18, **Ikegami et al.** fails to disclose the performance-tuning material including one or a combination of two or more materials selected from the group consisting of polytetrafluoroethylene, fluorosilicone, polyethylene, polypropylene, silicon carbide, silicon nitride, diamond, diamond-like carbon, and combinations thereof. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute one of the above materials for the performance-tuning material (resin 9) disclosed by **Ikegami et al.** as all are well known materials with well known properties and **Ikegami et al.** clearly indicates at column 10 lines 45-60 that other compounds such as organic hydrocarbons can be utilized in place of the preferred performance-tuning material (resin 9) disclosed. Furthermore, it has been held by the courts that the use of routine experimentation to determine preferred materials and optimum ranges is not a patentable invention (see In re Aller, 105 USPQ 233 (CCPA 1955), In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980), and In re Leshin, 125 USPQ 416 (CCPA 1960)).

With regards to claims 19-21, **Ikegami et al.** discloses the claimed invention with the exception of the performance-tuning material specifically comprising a fluoropolymer, a ceramic, or a metal nitride. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute one of the above materials for the performance-tuning material (resin 9) disclosed by **Ikegami et al.** as all are well known materials with well known properties and **Ikegami et al.** clearly indicates at column 10 lines 45-60 that other compounds such as organic hydrocarbons can be utilized in place of the preferred performance-tuning material (resin 9) disclosed. Furthermore, it has been held by the courts that the use of routine experimentation to determine preferred materials and optimum ranges is not a patentable

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invention (see In re Aller, 105 USPQ 233 (CCPA 1955), In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980), and In re Leshin, 125 USPQ 416 (CCPA 1960)).

With regards to claims 24-25, **Ikegami et al.** discloses the claimed invention with the exception of forming the performance-tuning material on the resonator before separating the multiple resonators from the wafer on which they were formed (see column 8 lines 54-67). It would have been obvious to one of ordinary skill in the art to reverse the application of the performance-tuning material and the resonator separating, as the end result is the same – that of having a resonator formed with a performance-tuning layer to protect it. One of ordinary skill in the art would recognize the advantages of forming the performance-tuning layer before separating as such would allow for a faster fabrication and better control on the overall application of the performance-tuning layer. Therefore, the switching of the order of forming the performance-tuning layer on the mechanical resonators would be an obvious variation based upon the machines available for forming the mechanical resonators and the final product desired.

With regards to claim 26, the performance-tuning material of **Ikegami et al.** is inherently resistant to the absorption of oils due to the nature of the silicone resin formed as the performance-tuning material.

Allowable Subject Matter

17. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

DeFonzo (US 4,282,499) discloses an optically tunable resonant structure.

Khoshnevisan et al. (US 5,438,234) discloses a thin film micromechanical resonator gyro.

Micak et al. (US 2003/0119220 A1) discloses a micromechanical piezoelectric device with a performance-tuning material.

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Kano et al. (US 5,936,159) discloses a semiconductor sensor having multi-layer movable beam structure film.

Yamada et al. (US 2002/0190814) discloses a thin film bulk acoustic resonator and method of producing the same.

Herb et al. (US 6,557,419 B1) discloses a zero TCF thin film resonator with a performance-tuning material embedded within the resonator.

Yamada et al. (US 6,936,837 B2) and **Yamada et al. (WO 02/093740 A1)** disclose film bulk acoustic resonators with performance-tuning materials.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rose M. Miller whose telephone number is 571-272-2199. The examiner can normally be reached on Monday - Friday, 7:30 am to 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



RMM
20 March 2006



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